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FEDERAL COMMUNICATIONS COMMISSION
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In the Matter of

Preparation for International
Telecommunication Union World
Radiocommunication Conferences

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IC Docket No. 94-31

COMMENTS OF LORAL/QUALCOMM PARTNERSHIP, L.P.

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Executive Summary

The Commission, in its Second Notice of Inquiry in preparation for WRC-95, has established a sound basis for United States proposals which will support the timely introduction of low-earth orbit mobile-satellite service (MSS) systems such as Globalstar, which the Commission recently licensed. The Commission's proposals to improve the user link allocations, in the 1610-1626.5 MHz and 2483.5-2500 MHz bands, with modification, will enhance the capability of MSS systems to serve the public. The Commission, however, should propose the elimination of the final sentence of RR 731E, to avoid any suggestion that MSS systems need provide in-band protection to GLONASS. In addition, RR 733E should be suppressed, now that radio-astronomy and MSS are co-primary. The proposed revision to RR 753F concerning the power-flux density limits applicable to MSS systems operating in the 2483.5-2500 MHz bands, should be adopted with minor modifications.

The introduction of handheld MSS also will be supported by multiple feeder link allocation proposals in the C, Ku and Ka-bands. Multiple feeder link allocations are needed to support the United States as well as overseas systems in the frequency bands which those systems are designed to use. Feeder link band pairing should be flexible to address possible actions of WRC-95, as well as to consider sharing with other services. Feeder link allocations should suppress the applicability of RR 2613 in order to provide parity with fixed-satellite service operations and should utilize Resolution 46 to address coordination of feeder link assignments with other services in the same frequency band.

The United States should take care to maintain the focus of its proposals and efforts at WRC-95 on promoting MSS. Proposals from newly conceived systems, which have not been technically reviewed or considered within the ITU-R, should be deferred until WRC-97. As well, the United States should ensure that regulatory procedures are not utilized to confer enhanced status on secondary allocations.

Additional MSS allocation proposals should be submitted by the United States to WRC-95, to ensure that MSS systems will have adequate spectrum for future expansion. These proposals should take into consideration the Commission's proposed revision of the 2 GHz MSS allocations as a result of domestic PCS decisions.

In sum, the Commission has developed a comprehensive and largely workable set of United States proposals, which, with the modifications proposed herein, will enable the achievement of the United States' objectives of promoting handheld MSS to the benefit of telecommunications users and the U.S. economy.

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Loral/QUALCOMM Partnership, L.P. ("LQP"), hereby submits its comments in response to the Commission's Second Notice of Inquiry, ("Second Notice"), in preparation for the 1995 World Radiocommunication Conference ("WRC-95").¹ The Commission, on January 31, 1995, authorized LQP to construct, launch and operate a non-geostationary Mobile-satellite (MSS) system in the 1610-1626.5 MHz and 2483.5-2500 MHz bands, and, on a conditional basis, to construct the system using feeder links in the 5025-5225 MHz (Earth-to-space) and 6875-7075 MHz (space-to-Earth) frequency bands.² LQP plans to provide MSS both in the United States and internationally, and so has a substantial interest in the development of United States proposals for WRC-95.

In its Second Notice, the Commission recommends United States proposals to WRC-95 which will both enhance the current allocations for MSS, and provide

² Order and Authorization, ("LQP Licensing Order"), File Nos. 19-DSS-P-91(48), CSS -91-014 and 21-SAT-MISC-95, DA 95-128, released January 31, 1995.

additional frequency bands to accommodate growing demand for the service. In addition, the Commission proposes a number of frequency bands for use by non-geostationary (NGSO) MSS feeder links. These feeder link proposals will support the current U.S. licensees' first generation requirements as well as provide for feeder link needs of non-U.S. systems. The feeder link proposals may also accommodate second generation NGSO MSS systems. Overall, the Commission has done an excellent job of incorporating the interim proposals of the WRC-95 Industry Advisory Committee, of which LQP is an active member.

LQP, in these comments, supports most of the Commission's proposals. However, in a few areas, LQP recommends that the Commission take more aggressive positions to improve the current MSS user link allocations. In addition, the Commission should take care that any regulatory proposals are consistent with the objectives of smooth implementation of the systems licensed by the United States, and are consistent with the position of the United States concerning the status of operations utilizing secondary allocations.

With the proposals of the Second NOI as a starting point, adjusted as outlined herein, the Commission can realize the objectives of the United States in the implementation of MSS to the benefit of telecommunications users around the world as well as the United States economy.

II. Mobile Satellite Service - User Links

As the Commission states in the Second NOI, "[A]t WRC-95, the United States will have the opportunity to improve the use of existing MSS bands by eliminating technical, operational, and regulatory barriers..."³ The Commission recognizes that these barriers have been studied in depth since WARC-92 within the various ITU-R Study Groups and that the results of the work of these Study Groups is, in large measure, contained in the draft report of the 1995 Conference

³ Second Notice, at para. 8.

Preparatory Meeting (CPM).⁴

A. The United States Should Propose Revisions to RR 731E Which Eliminate the Obligation to Protect GLONASS Operating Co-channel with MSS

The Commission has proposed revisions to RR 731E which do not fully meet the operational needs of MSS. The final sentence of footnote 731E states that "MSS mobile earth stations (MES) shall not cause harmful interference to, nor claim protection from stations in the aeronautical radionavigation service, stations operating in accordance with RR No. 732 and fixed stations operating in accordance with RR No. 730." *In order to clarify the primary status of MSS as well as the fact that MSS is not obligated to provide additional protection to co-channel operation of the GLONASS system, the Commission should adopt the approach, previously urged by LQP and others, of deleting the final sentence of RR 731E.*⁵ The final sentence is unnecessary and injects confusion into RR 731E, which WRC-95 provides an opportunity to clarify.

The Commission proposes to address this concern by deleting the final sentence and replacing it with text noting the application of RR No. 953 in the 1610-1626.5 MHz band. RR No. 953 provides:

Members recognize that the safety aspects of radionavigation and other safety services require special measures to ensure their freedom from harmful interference; it is necessary therefore to take this factor into account in the assignment and use of frequencies.

LQP appreciates the Commission's effort to eliminate the contradiction of the final sentence of RR 731E; however, the proposal to reference RR No. 953 is

⁴ The CPM will take place from March 22 - April 4, 1995, to finalize the Report of the CPM to WRC-95, and that report will provide the technical basis for WRC-95.

⁵ See, e.g., Notice of Inquiry, IC Docket No. 94-31, 9 FCC Rcd 2430 (1994), Comments of LQP, at pages 15-18, Comments of TRW Inc., at pages 6-7 and Reply Comments of Motorola Satellite Communications, Inc., at pages 7-9.

not required in light of developments concerning the use of the 1610-1626.5 MHz band by the station operating in accordance with RR No. 732 (GLONASS). As the Commission is aware, the GLONASS Administration has agreed to a revised frequency plan, so that it will operate no higher than 1605 MHz for its civil service, in the ultimate configuration. At the September, 1994 meeting between United States government representatives and Russian government representatives, Russia agreed to this revision, agreed to modify the GLONASS Interface Control Document, and agreed to coordinate with the U.S. NGSO MSS systems in accordance with its three-stage revision plan.⁶ The U.S. also encouraged Russia to expedite the transition to the ultimate frequency configuration.

Russia recently acknowledged the frequency configuration of GLONASS at the November-December, 1994 international meeting of ITU-R Working Party 8D.⁷ In addition, the FCC, NTIA and the U.S. Department of State have entered into a Memorandum of Understanding concerning the development of appropriate out-of-band emission limits to ensure that MESs protect GLONASS in its ultimate frequency configuration. This MOU provides that the development of such limits is to occur within the RTCA, Inc., a forum constituted to develop standards for the use of navigational aids utilizing the electromagnetic spectrum. This process currently is underway and LQP is an active participant.

Now that these steps have been taken, the only issue with regard to GLONASS is protection of receipt of GLONASS transmissions which are not co-frequency with those of MSS. Consequently, the final sentence of Footnote 731E is moot and unnecessary in addressing the out-of-band interference issue.

LQP agrees that the United States must propose revision of Footnote 731E

⁶ Summary and Action Items concerning the US/Russian Federation Meeting, September 26-30, 1994, provided by the U.S. Department of State at the U.S. industry de-briefing.

⁷See Document 8D/46/ADD.1, December 6, 1994.

regarding protection of the GLONASS system, to assure that MSS systems will have full use of the 1610-1626.5 MHz band. But, reference to RR 953 is not the most effective solution. Elimination of the final sentence of the footnote, as LQP proposed in its Comments on the Commission's first Notice of Inquiry with regard to preparation for WRC-95, will enable MSS to proceed with the use of this band without real or perceived constraints on the use of the 1610-1626.5 MHz band.

In accordance with this recommendation, LQP, as well as Informal Working Group 3 of the WRC-95 Industry Advisory Committee, have developed the following revision of RR No. 731E for inclusion in U.S. proposals:

MOD 731E The use of the band 1 610-1 626.5 MHz by the mobile-satellite service (Earth-to-space) and by the radiodetermination-satellite service (Earth-to-space) is subject to the application of the coordination and notification procedures set forth in Resolution **46 (WARC-92)**. A mobile earth station operating in either of the services in this band shall not produce an e.i.r.p. density in excess of -15 dB(W/4 kHz) in the part of the band used by systems operating in accordance with the provisions of No. **732**, unless otherwise agreed by the affected administrations. In the part of the band where such systems are not operating, a value of -3 dB(W/4 kHz) is applicable. ~~Stations of the mobile satellite service shall not cause harmful interference to, or claim protection from, stations in the aeronautical radionavigation service, stations operating in accordance with the provisions of No. **732** and stations in the fixed service operating in accordance with the provisions of No. **730**.~~

GLONASS operations below 1605 MHz can be protected by MSS without impairing the use of the system as a part of the Global Navigation Satellite System (GNSS) which would utilize both GPS and GLONASS in aeronautical navigation, including precision landing.⁸

⁸ MSS Above 1 GHz Rulemaking, CC Docket No. 92-166, LQP Reply Comments, Technical Appendix at 15, filed June 20, 1994.

Revision of this footnote supports U.S. policies to promote MSS. Moreover, this revision of Footnote 731E will enable MSS systems to utilize the full 1610-1626.5 MHz without any impact on the GLONASS mission. Any protection the final sentence of the footnote may offer GLONASS is not required to enable the utilization of GLONASS in a Global Navigation Satellite System (GNSS), in the event the U.S. government supports and the international aviation community adopts the use of a GNSS which includes both GPS and GLONASS.

As the MSS Above 1 GHz NRM Committee recommended:

the best solution to enable both MSS and GLONASS to operate compatibly without operational constraints is to effect a reconfiguration of the GLONASS frequency plan.⁹

This objective has been achieved, and the United States government has encouraged Russia to expedite the transition to the ultimate frequency configuration, with no civil signals above 1605 MHz.¹⁰

Moreover, deletion of the last sentence of the RR 731E at WRC-95 is critical to ensure that GLONASS receiver manufacturers are placed on notice to install filters preventing receipt of transmissions above 1605 MHz for future operations. Extensive investment in GLONASS receivers which can receive signals above 1605 MHz could create a community with an economic interest in imposing excessive out-of-band protection limits on MSS, and therefore must be deterred.

⁹ Supra. at p. 43.

¹⁰ LQP notes that Russia had previously committed to excluding the main emission of their broadband class (10M2G7X) from being in the 1610.6-1613.8 MHz radio astronomy band by 1999. Since the 10M2 designator indicates a 5.1 MHz one-sided bandwidth, this means that the highest GLONASS carrier frequency would be 1605.5 MHz. See Document 43-E, 16 November, 1993, submitted by Russia to WRC-93. LQP suggests that the United States inquire as to why Russia is planning to delay the frequency shift committed to in 1993 by six or seven years to the year 2005. See Document 8D/46(Add.1)-E, 6 December 1994 which provides an update of the GLONASS-M frequency transition plan.

In the event the international aviation community decides that the GNSS should include both GPS and GLONASS to provide a level of integrity checking of navigational data, all the GLONASS frequencies are not required to achieve the benefits of using both systems. The Sat-Tech Study, commissioned by LQP,¹¹ supports the conclusion that virtually all aviation objectives can be achieved through use of GPS and as few as six GLONASS satellites operating below 1605 MHz.¹² The Sat-Tech Study further points out that the aviation community is planning to use other navigation systems, including terrestrial differential GPS, geostationary satellites, wide-area augmentation systems (WAAS) and barometric altimeters on-board aircraft in conjunction with the GNSS. Such configurations will increase navigation integrity even further. Thus, the GNSS, in the extremely unlikely event it were implemented for aeronautical navigation use prior to implementation of the final GLONASS frequency configuration, need not include GLONASS frequencies above 1605 MHz to achieve operational objectives and requirements.

Consequently, maintaining the final sentence of RR 731E which suggests an obligation on MSS to protection receipt of GLONASS signals operating co-channel with MSS is neither necessary nor desirable, and could impose substantial burdens on MSS,¹³ as well as deprive MSS operators and users of communications

¹¹ LQP Reply Comments, Technical Appendix at 15, cited supra.

¹² Current planning of the Russian Federation indicates up to 24 satellites operating below 1605 MHz at the time of MSS service launch. Thus, with anti-podal operation, there will be 12 GLONASS satellites available for GNSS, which is sufficient to handle GLONASS failures.

¹³ For example, the Commission, in its Report and Order adopting licensing and service rules for MSS above 1 GHz, provides that an interim spectrum use plan may be implemented which could cause the loss of two MHz at the lower end of the 1610-1626.5 MHz band. See, In the Matter of Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626.5 /2483.5-2500 MHz Frequency Bands, 9 FCC Rcd 5936 (1994) ("Big LEO Rules Order"). Consistent with this decision, the Chief, International Bureau, indicated in the licenses issued to LQP and TRW

capacity.

Also, with regard to RR 731E the Commission proposes to clarify the method of calculating the e.i.r.p. density level permitted for MSS MESs. RR 731E provides that MESs are limited to an e.i.r.p. density of -15 dB(W/4 kHz) in those parts of the band where RR 732 systems, e.g., GLONASS, are operating, and that in other parts of the band, MESs can operate up to an e.i.r.p. density of -3 dB(W/4kHz). The Commission, responding to a proposal of Motorola Satellite Communications, Inc., states that there is a need to clarify whether these levels correspond to peak or mean values, and proposes that 731E be revised to specify that a "mean" value be used and invites parties to provide or develop a method for calculating the mean e.i.r.p. density.¹⁴

LQP recommends that the e.i.r.p. density levels correspond to "peak" values. Utilizing peak rather than mean values will enhance coordination of multiple systems using the 1610-1626.5 MHz band. However, if the Commission decides that a "mean" value is preferred in order to allow transmissions to exceed the existing -15 and -3 dB(W/4kHz) levels, then LQP proposes that there be a limit on the ratio of "peak" to "mean" e.i.r.p. density levels of no greater than a factor of 3 dB averaged over a time period of 30 seconds. And, when MESs operate at e.i.r.p. density levels below -15 and -3 dBW/4 kHz in the relevant portions of the band, there should be no limit on the "peak" to "mean" ratio.

Inc., that "in the event the 1610-1612 MHz band is not available for mobile satellite service operations in the United States," the systems would be authorized to operate in the 1612-1622.60/2483.5-2500 MHz bands. LQP Licensing Order, at para. 25.

¹⁴ Second Notice, at para. 23 and footnote 27.

B. The United States Should Propose Deletion of RR 733E Which is Not Required in View of the Co-Primary Status of MSS and Radio Astronomy

In its Second Notice, the Commission rejects the recommendation of the MSS participants in the Industry Advisory Committee that RR 733E be suppressed.¹⁵ The MSS participants, including LQP, believe that 733E, which provides for protection of radio astronomy, is an anachronism, dating from the time when radio astronomy was secondary in the 1610.6-1613.8 MHz band, and the Radio-determination satellite service had been allocated on a primary basis in Region 2 and on a secondary basis in parts of Regions 1 and 3. The Commission cites the statement of the radio astronomy community that RR 733E "is a flag that reminds other spectrum users of the need to use special coordination measures when operating in the 1610.6-1613.8 MHz band."¹⁶

A "flag" is not required when services are co-primary. The Commission, with the assistance of the MSS Above 1 GHz Advisory Committee, has adopted very stringent protective measures for radio astronomy.¹⁷ Other administrations, when licensing MSS mobile earth terminals, can similarly consider what protective measures are suitable for radio astronomy sites within their territories. LQP also opposes the Commission's alternative suggestion of proposing suppression of RR 733E and adoption of a new international footnote that incorporates the radio astronomy protection rules embodied in the Big LEO Rules Order.¹⁸ Such an approach would be an attempt to export the solution found appropriate for the radio astronomy sites, as well as the geography and operating environment, in the United States. This approach might not be suitable for either MSS or radio astronomy in every country of the world, and is inconsistent with

¹⁵ Second Notice, at para. 27.

¹⁶ Supra, at para. 26.

¹⁷ See Big LEO Rules Order, supra, at paras. 113, 117 and 121.

¹⁸ Supra, at paras. 101-109; see also, 47 C.F.R. §25.213(a).

the Commission's policy of not imposing United States spectrum rules on other countries.

RR 733E no longer serves the purpose for which it was adopted. The most appropriate replacements are administration-by-administration rules tailored to fit radio astronomy in a specific country. *Accordingly, LQP recommends that the United States propose suppression of RR 733E without adoption of other requirements.*

C. The Commission's Proposed Revision of RR 753F Reflects the Ability of CDMA MSS Systems to Protect Terrestrial Fixed Stations in the 2483.5-2500 MHz Band While Operating at Higher PFDs

The Commission proposes that RR 753F be revised as follows:

MOD 753F The use of the band 2483.5-2500 MHz by the mobile-satellite service and the radio-determination-satellite service is subject to the application of the coordination and notification procedures set forth in Resolution **46 (WARC-92)**. Coordination of space stations of the mobile-satellite and radiodetermination-satellite services with respect to terrestrial services is required only if the power-flux density produced at the Earth's surface exceeds ~~the limits in No. 2566.~~

-150 dB(W/m²) in any 4 kHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

-150 + 0.65(δ-5) dB(W/m²) in any 4 kHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane;

-137 dB(W/m²) in any 4 kHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

These limits relate to the power flux-density which would be obtained under assumed free-space propagation conditions.

In respect of assignments operating in this band, the provisions of Section II, paragraph 2.2 of Resolution **46 (WARC-92)** shall also be applied to geostationary transmitting space stations with respect to

terrestrial stations.

LQP supports this proposal, with a revision to clarify that the power-flux density is to be applied on a per space station basis. Thus, the text should be modified in pertinent part, to read:

MOD 753F The use of the band 2483.5-2500 MHz by the mobile-satellite service and the radio-determination-satellite service is subject to the application of the coordination and notification procedures set forth in Resolution **46 (WARC-92)**. Coordination of space stations of the mobile-satellite and radiodetermination-satellite services with respect to terrestrial services is required only if the power-flux density produced at the Earth's surface exceeds ~~the limits in No. 2566~~ on a per space station basis:

This recommendation to apply a higher power-flux density limit to the band 2483.-2500 MHz is consistent with that of the MSS participants of the Industry Advisory Committee, with previous filings of LQP, and with the conclusions of ITU-R Task Group 2/2. Recent analyses of the impact of the proposed operation of a non-geostationary MSS system on fixed services operating in the 2483.5-2500 MHz band demonstrate that typical CDMA non-GSO MSS operations, at the higher PFD proposed, will meet protection requirements recommended by the ITU-R to safeguard the operation of analog point-to-point and multipoint fixed systems.¹⁹ A revision to RR 753F will eliminate unnecessary coordinations, and permit administrations latitude in the coordination process.²⁰

Accordingly, LQP agrees with the Commission's proposed modification to RR 753F, subject to the revision clarifying that the PFD threshold is applicable on a per space station basis.

¹⁹ See Document 2-2/TEMP/89 (Rev.1), 8 December, 1994.

²⁰ Second Notice, at para. 31.

III. Feeder Link Proposals

LQP supports the Commission's proposals for feeder links for NGSO MSS systems, particularly those that apply to allocations below 16 GHz. The Commission has correctly given great weight to the work of the MSS proponents within the WRC-95 Industry Advisory Committee as well as the output from ITU-R Task Groups 8/3 and 4/5. Consistent with the assessments of these groups, the Commission proposes NGSO MSS feeder link allocations in a number of frequency bands, including the C, Ku and Ka-band. The Commission also recognizes the need to accord NGSO MSS feeder links equal status with FSS operations in the same frequency bands. LQP agrees that when NGSO MSS feeder links operate in the opposite direction of transmission from FSS allocations, the proposed suppression of RR 2613 is appropriate. The Commission also correctly proposes to apply the coordination procedures of Resolution 46 to coordination between GSO MSS and NGSO MSS networks, between multiple NGSO MSS networks and between NGSO MSS networks and terrestrial services.²¹

A. The Commission Should Propose Feeder Link Allocations in a Range of Frequency Bands

*LQP generally is in accord with the bands selected by the Commission for NGSO MSS feeder link proposals and the approach proposed with regard to suspension of RR 2613 and application of Resolution 46. LQP, however, proposes a formulation for the footnote language which is slightly different from that proposed by the Commission. This alternate language, along with the frequency bands below 16 GHz which LQP believes should be contained in United States proposals, are contained in Annex I to these Comments.*²²

²¹ Second Notice, at para. 48.

²² LQP notes that the Second Notice incorrectly describes the feeder link bands sought for the GLOBALSTAR system. See, Second Notice, at footnote 72. The correct bands are 5025-5225 MHz (Earth-to-space) and 6875-7075 MHz (space-to-

LQP particularly appreciates the efforts of the Commission that have led to its proposed allocation of the 5000-5250 MHz band for NGSO MSS feeder links in the Earth-to-space direction. LQP has urged that this band be included in the United States proposal and has provided numerous analyses of how this band can be used without causing harmful interference to aeronautical radionavigation services, including MLS (microwave landing system).²³ Extensive work also was undertaken within TG 4/5 and TG 8/3, resulting in favorable conclusions about the feasibility of using this band for NGSO MSS feeder links in the Earth-to-space direction.²⁴

LQP's technical analyses confirm that NGSO MSS feeder links can share the 5000-5250 MHz band with MLS, utilizing various sharing and interference mitigation techniques.²⁵ In contrast, the FCC, in the Second Notice, cites ITU-R Task Group 4/5 comment that MSS and MLS should not use overlapping spectrum as well as Task Group 4/5's comment that MLS could be reorganized in the future into the 5000-5120 MHz portion of the band.²⁶ The FCC states that this would yield 130 MHz of non-overlapping, contiguous spectrum that could be used for NGSO MSS feeder links on a non-sharing basis, plus an additional 30 MHz of contiguous spectrum (5090-5120 MHz) until 2015.²⁷

Earth).

²³ See, "Interference Assessment of MSS Gateway Uplink Transmissions Relative to MLS Airborne Users," prepared by Sat-Tech Systems, LQP Reply Comments in CC Docket No. 92-166, Technical Appendix, Attachment 4, June 20, 1994.

²⁴ See Document TG 4-5/TEMP38-E, 25 November, 1994 and Document TG 8-3/TEMP/49(Rev.1)-E, 24 November, 1994.

²⁵ LQP Technical Appendix, cited supra.

²⁶ As discussed in LQP's submissions in CC Docket No. 92-166, spectrum sharing between NGSO MSS feeder uplinks and MLS is feasible given the limited number of gateways that will be required in the United States and worldwide.

²⁷ Second Notice, at Note 5 to Table 2, page 29.

LQP urges the Commission to take note that the current MLS frequency plan, of 200 channels, is to be implemented initially in the 5030-5090 MHz band, and that this amount of spectrum "is expected to support the aviation requirements until about the year 2015." See Document TG 4-5/117-E, 24 November, 1994. Thus, until 2015, MSS could utilize up to 160 MHz of contiguous spectrum in the 5000-5250 MHz band on a non-sharing basis. After that date, if MLS had additional requirements, it could utilize the 5000-5030 MHz band.

The Commission proposes to allocate the entire 5000-5250 MHz band for NGSO MSS feeder links, subject to coordination with aeronautical radionavigation services in the portions of the band to be used by MLS. LQP supports this approach, as it will encourage development of appropriate sharing arrangements to accommodate both NGSO MSS feeder links as well as MLS.

LQP urges the Commission to continue its efforts to ensure that the 5000-5250 MHz band will be a part of the United States proposal. These efforts should include ensuring that the United States' position for the March, 1995 International Civil Aviation Organization (ICAO) meeting is consistent with the position of the United States, agreed to by both government and private sector representatives, at the November, 1994 TG 8/3 and TG 4/5 meetings. The inclusion of the proposed footnotes to enable portions of the 5000-5250 MHz band to be used for NGSO MSS feeder links (Earth-to-space) is critical to enable LQP and other NGSO MSS systems to achieve their objective of providing high-quality, low-cost service.

One frequency band for NGSO MSS feeder links addressed by the Commission -- the 15.4-15.7 GHz band -- requires a revision from the proposal contained in the Second Notice. LQP urges that the Commission identify this band as available for NGSO MSS feeder links in the Earth-to-space direction, rather than the space-to-Earth direction. In the bands below 16 GHz, there are numerous frequencies which can be used for NGSO MSS feeder links in the space-to-Earth direction, with few bands available in the Earth-to-space direction. For this reason, and because of its light use, the 15.4-15.7 GHz band would be highly

suitable for NGSO MSS feeder links in the Earth-to-space direction.²⁸ Another possibility would be for the Commission to propose that the band be allocated for NGSO MSS feeder links in both the Earth-to-space and the space-to-Earth directions.

With regard to allocations for NGSO MSS feeder links above 16 GHz, LQP also supports the Commission's proposals. Identifying feeder link bands in all three major frequency bands is essential to meet the requirements of the currently licensed U.S. systems (LQP, Motorola and TRW Inc.), to provide for the possibility of additional U.S.-licensed systems, and to provide for other NGSO MSS systems which may be established by international organizations or licensed by other countries. In addition, allocating a number of frequency bands will ensure that sufficient feeder link spectrum will be available for second generation systems, including those that may utilize 2 GHz MSS allocations for service links.²⁹

B. The Commission Should Take A Flexible Approach With Regard to the Pairing of Feeder Link Allocations

The Commission should identify pairing of allocations to be used for NGSO MSS feeder links in such a manner as to ensure that the few bands available for NGSO MSS feeder links in the Earth-to-space direction are appropriately paired with a range of bands identified for use in the space-to-Earth direction. It is critical that the United States obtain a number of NGSO MSS feeder link allocations, in all three frequency bands. In order to ensure that sufficient NGSO MSS feeder uplinks are allocated, the United States must strive to obtain allocations in the 5 GHz and 15.4-15.7 GHz band. If feeder uplink allocations can

²⁸ The 15.4-15.7 GHz band should be paired with a band below 16 GHz to minimize the impact of propagation conditions on NGSO MSS system design.

²⁹ See In the Matter of Amendment of Section 2.106 of the Commission's Rules to Allocate Spectrum at 2 GHz for Use by the Mobile-Satellite Service, Notice of Proposed Rulemaking, ET Docket No. 95-18, FCC 95-39 (January 31, 1995).

possibly be obtained in the 4.5-4.8 GHz, 10.7-10.95 GHz and 11.2-11.45 GHz bands, these also should be pursued.

Thus, because of the uncertainty as to which bands will be allocated, and which feeder downlink bands will prove most feasible for implementation, the Commission should recommend that the feeder downlinks be greater in bandwidth than the feeder uplinks. Consequently, in the C-band, LQP recommends that the following band pairings be adopted:

NGSO MSS C-Band Feeder Link Pairings (First Priority)

<u>Earth-to-space</u>	<u>Space-to-Earth</u>
5000-5250 MHz	6825-7075 MHz
4500-4800 MHz	6825-7075 MHz

In the Second Notice, the Commission suggested that the 5000-5250 MHz band be paired with the 6525-6725 MHz portion of the 6525-7075 MHz band.³⁰

In the alternative, LQP recommends that the Commission pair the 5000-5250 MHz band with 6725-7075 MHz. Similarly, the 4500-4800 MHz band should be paired with the 6825-7075 MHz band.

LQP within the MSS Above 1 GHz rulemaking, provided substantial analysis of the feasibility of NGSO MSS feeder link sharing with the other services of the entire 6525-7075 MHz band when operated in the reverse band

³⁰ Second Notice, Footnotes 83 and 84.

mode from the fixed-satellite service allocation.³¹ However, in LQP's view, the 6825-7075 MHz band is a more attractive option as an MSS feeder downlink. Although broadcast auxiliary operations exist in this band, as well as terrestrial microwave services, the low PFDs of NGSO MSS feeder downlinks (less than -158 dBW/m²/4kHz) easily permit sharing. The Commission will have more flexibility to decide at a later date whether to extend the pairing to 6525-6825 MHz as well.

A second choice for C-band NGSO MSS feeder link band pairings is as follows:

NGSO MSS C-Band Feeder Link Pairings (Second Priority)

<u>Earth-to-space</u>	<u>Space-to-Earth</u>
5000-5250 MHz	6525-6775 MHz
4500-4800 MHz	6525-6775 MHz

³¹ See, Comments of LQP in CC Docket No. 92-166, Technical Appendix, Volume II, filed May 5, 1994. See also, Document TG 4-5/52, June 1994).

In the Ku-band, LQP's recommended NGSO MSS feeder link band pairings are as follows:

NGSO MSS Ku-Band Feeder Link Pairings

<u>Earth-to-space</u>	<u>Space-to-Earth</u>
10.7-10.95 GHz	12.75-13.25 GHz
11.2-11.45 GHz	12.75-13.25 GHz
15.4-15.7 GHz	12.75-13.25 GHz

Because of the use of 10.7-10.95 GHz and 11.2-11.45 GHz by fixed-satellite service systems employing VSATS or providing direct-to-home television, LQP recognizes the challenge of obtaining allocations for NGSO MSS feeder uplinks in these bands. Consequently, the Commission and the United States must continue to pursue the allocation of 15.4-15.7 GHz for NGSO MSS feeder uplinks.

C. The Commission Should Ensure That the United States Maintains a Priority on Obtaining Suitable Feeder Link Allocations for NGSO MSS at WRC-95

Over the past four years, the NGSO MSS proponents, including LQP, the Commission and other United States government entities, including the National Telecommunications and Information Administration and the Department of State, have expended considerable resources to promote the implementation of NGSO MSS systems. The Commission conducted an extensive process to address licensing and service rules for NGSO MSS in the 1610-1626.5 MHz and 2483.5-

2500 MHz bands, including a lengthy Negotiated Rulemaking Proceeding.³² The application process, as well, involved considerable time and effort.

On the international front, the NGSO MSS proponents, including LQP, in conjunction with the United States government, have undertaken extensive technical and regulatory efforts within the ITU, including several ITU-R Study Groups. These efforts have led to the identification, within the United States, and within the ITU-R, of a number of frequency bands which can be allocated for NGSO MSS feeder links, of development of methodologies for sharing with other services in those bands, and of articulation of regulatory procedures which will accommodate the NGSO MSS feeder links.

Bringing this critical work to fruition at the upcoming WRC-95 Conference Preparatory Meeting (CPM-95) at WRC-95 should be paramount in the mind of all United States participants. The United States has worked since prior to WARC-92 to meet the feeder link requirements of NGSO MSS systems. This process has involved an enormous effort in identifying the operational needs of these systems, developing recommended solutions to meet those needs, analyzing sharing with other services, and working within the United States and the ITU-R to have appropriate recommendations adopted. The goals set for these systems can be met at WRC-95 so long as the focus of United States efforts at the CPM and WRC-95 remains on meeting the requirements of MSS, particularly the NGSO systems.

Accordingly, LQP urges the Commission to continue to focus on allocations for feeder links for the NGSO MSS systems operating between 1-3 GHz.

³² See, Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626.5/2483.5-2500 MHz Frequency Bands, 9 FCC 2d 1094 (1994), Big LEO Rules Order, cited *supra*, and Report of the MSS Above 1 GHz Negotiated Rulemaking Committee (Apr. 6, 1993).

IV. Regulatory Procedures

The Commission, in the Second Notice, seeks input on a number of regulatory/procedural issues relating to MSS between 1 and 3 GHz. These issues include consideration of revisions to Resolution 46 to reduce the number of coordinations required for NGSO MSS systems and other systems, the provision of a specific method to calculate coordination regions to determine which stations of terrestrial networks "might be affected," and defining what additional information should be provided in Appendix 3 to enable the Radio Registration Board to perform necessary calculations with regard to NGSO MSS networks.³³ The Commission also seeks comments on the need to propose revisions to regulatory procedures which affect feeder links, including possible revisions to RR 2613.³⁴

A. The United States Should Propose that Additional Information Be Required in Appendix 3

LQP recommends that the United States propose that Appendix 3 be revised to require the following additional information for NGSO systems, which utilize circular orbits:

- (1) the satellite antenna gain $G(\theta_e)$ as a function of the elevation angle from a fixed point on the surface of the earth in accordance with the method in Appendix 4; and
- (2) the spreading loss, $L_n(\theta)$ as a function of elevation angle, for the particular satellite.

This additional information, if included in Appendix 3 filings, will assist the Radio Registration Board (RRB) in correctly computing the maximum achievable power flux density for NGSO MSS networks. The above information was developed by LQP, in conjunction with the Commission staff, for inclusion in a

³³ Second Notice, paras. 41-44.

³⁴ Supra., at para. 45.

contribution to the November, 1994 meetings of TG 8-3 and WP 8D.³⁵ This submission was developed after the RRB, using the information contained in an Appendix 3 filing, demonstrated the difficulty in correctly calculating the power flux density for a NGSO MSS network. Requiring the additional information specified above should enable the RRB to calculate the PFD correctly in the case of NGSO MSS systems.

Another approach, which would be applicable to both NGSO elliptical as well as circular orbits, would be to require that Appendix 3 data include a PFD profile.

B. The United States Should Propose Revisions to Resolution 46 Which Reduce the Number of Coordinations Required Between NGSO MSS Networks and Terrestrial Systems

When Resolution 46 was drafted, detailed analyses of the sharing situation between NGSO MSS systems and other services, including the terrestrial fixed service, had not been undertaken. Since WARC-92, however, the ITU-R has undertaken extensive analysis of these sharing situations. This analysis has led to the conclusion that NGSO MSS systems using CDMA in the 2483.5-2500 MHz band can operate at slightly higher PFDs than permitted under RR 2566, and not cause unacceptable interference to terrestrial fixed systems.³⁶ In light of this experience, Task Group 2/2 adopted a Recommendation concerning new PFD levels to be used as a threshold for coordinations between NGSO MSS networks and terrestrial systems.

Thus, LQP recommends that the Commission propose the following revision to Resolution 46, to reduce the number of coordinations required between NGSO MSS networks and terrestrial systems:

³⁵ See Document 8-3/100-E, also titled Document 8D/35-E, dated 16 November, 1994.

³⁶ See Document TG 2-2/TEMP/89 (Rev.1), 9 December 1994.